

## CLAIMS

At least the following is claimed:

- 1 1. A solid freeform fabrication system for producing a three-dimensional  
2 object, comprising:  
3 a dispensing system adapted to dispense a radiation initiator and a  
4 build material, the radiation initiator and the build material being stored  
5 separately in the dispensing system, the radiation initiator and the build  
6 material being dispensed separately; and  
7 a curing system operative to cure the radiation initiator and the build  
8 material after each have been dispensed.  
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- 2 2. The solid freeform fabrication system of claim 1, wherein the  
3 dispensing system includes at least one ink-jet printhead.
- 1 3. The solid freeform fabrication system of claim 2, wherein a first ink-jet  
2 printhead includes the radiation initiator in a first compartment and the build  
3 material in a second compartment.
- 1 4. The solid freeform fabrication system of claim 2, wherein a first ink-jet  
2 printhead includes the radiation initiator and a second ink-jet printhead  
3 includes the build material.
- 1 5. The solid freeform fabrication system of claim 1, wherein the radiation  
2 initiator is an ultraviolet (UV) initiator.
- 1 6. The solid freeform fabrication system of claim 5, wherein the UV  
2 initiator has a viscosity less than 70 centipoise at a temperature below about  
3 200°C.

1 7. The solid freeform fabrication system of claim 5, wherein the UV  
2 initiator has a viscosity less than 20 centipoise at a temperature below about  
3 120°C.

1 8. The solid freeform fabrication system of claim 5, wherein the UV  
2 initiator is selected from a free radical initiator, a cationic initiator, and  
3 combinations thereof.

1 9. The solid freeform fabrication system of claim 5, wherein the UV  
2 initiator includes a colorant.

1 10. The solid freeform fabrication system of claim 1, wherein the build  
2 material has a viscosity less than 70 centipoise at a temperature below about  
3 200°C.

1 11. The solid freeform fabrication system of claim 1, wherein the build  
2 material has a viscosity less than 20 centipoise at a temperature below about  
3 120°C.

1 12. The solid freeform fabrication system of claim 1, wherein the build  
2 material is selected from acrylic compounds, compounds having one or more  
3 epoxy substituents, one or more vinyl ether substituents, vinylcaprolactam,  
4 vinylpyrrolidone, urethanes, and combinations thereof.

1 13. The solid freeform fabrication system of claim 1, wherein the build  
2 material includes a dye.

1 14. The solid freeform fabrication system of claim 1, further comprising a  
2 computer control system operative to control the dispensing system and the  
3 curing system.

1 15. The solid freeform fabrication system of claim 1, wherein the curing  
2 system comprises an ultraviolet curing system.

1 16. A method of producing a three-dimensional object, comprising the  
2 steps of:

3 providing a radiation initiator;  
4 providing a build material, wherein the radiation initiator and the build  
5 material are separated from each other;  
6 dispensing the radiation initiator and the build material onto a build  
7 platform independently, wherein the radiation initiator and the build material  
8 are commingled to form a multi-part radiation curable material; and  
9 curing the multi-part radiation curable material to produce the three-  
10 dimensional object.

1 17. The method of producing a three-dimensional object of claim 16,  
2 further comprising:

3 heating the build material to a temperature of about 40 to 200°C.

1 18. The method of producing a three-dimensional object of claim 16,  
2 further comprising:

3 heating the build material to a temperature of about 70 to 120°C.

1 19. The method of producing a three-dimensional object of claim 16,  
2 wherein dispensing includes:

3 dispensing a layer of the build material; and  
4 dispensing a layer of the radiation initiator onto the layer of the build  
5 material thereby forming the multi-part radiation curable material.

1 20. The method of producing a three-dimensional object of claim 16,  
2 wherein dispensing includes:

3 dispensing a layer of the radiation initiator; and

4           dispensing a layer of the build material onto the layer of radiation  
5 initiator thereby forming the multi-part radiation curable material.

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7   21.   The method of producing a three-dimensional object of claim 16,  
8 wherein dispensing includes:

9           dispensing the build material in a spaced manner; and

10          dispensing the radiation initiator within the spaces between the build  
11 material, wherein the build material and the radiation initiator form a layer of  
12 commingled build material and radiation initiator thereby forming the multi-  
13 part radiation curable material.

1   22.   The method of producing a three-dimensional object of claim 16,  
2 further comprising:

3           mixing the radiation initiator and the build material using ultrasonic  
4 energy.

1   23.   The method of producing a three-dimensional object of claim 16,  
2 wherein dispensing the UV initiator and the build material is performed  
3 sequentially.

1   24.   The method of producing a three-dimensional object of claim 16,  
2 wherein dispensing the radiation initiator and the build material is performed  
3 simultaneously.

1   25.   The method of producing a three-dimensional object of claim 16,  
2 further comprising means for controlling the temperature of the build platform.

1   26.   The method of producing a three-dimensional object of claim 16,  
2 wherein the radiation initiator is an ultraviolet initiator.

1   27.   The method of producing a three-dimensional object of claim 16,  
2 wherein dispensing the radiation initiator and the build material further  
3 comprises:

- 4 dispensing the radiation initiator from a first ink-jet printhead and
- 5 dispensingthe build material from a second ink-jet printhead.